# Fire Damper - Motorized

UL555 1½ Hour Fire Rating

Model FSD–A –S, FSD –A–L, FSD –A–L1 & FSD–A–M Fire dampers are designed with 2v double skin aero foil blade, to be installed in static systems vertically.

## Standard Construction

| | |
|---|---|
| Frame: | 2mm (14 gauge) galvanized steel. Formed from four hat channel shaped piece 165 mm wide having flanges for connecting damper to sleeve. |
| Blades: | 1mm (20 gauge) galvanized steel, 2V groove style |
| Linkage: | GI, concealed in frame |
| Bearings: | Flange type bearing, pressed in to frame |
| Jamb Seals: | 0.3mm thick stainless steel, flexible metal compression type |
| Closure Device: | Electric actuator connected with drive assembly |

## Specifications

Fire dampers meeting or exceeding the following specifications shall be furnished and installed at locations shown on plans or as described in schedules. Dampers shall be classified for use for fire resistance ratings of less than 3 hours.

Dampers and their actuators shall be qualified in accordance with UL555. Appropriate electric actuators shall be installed by the damper manufacturer at time of damper fabrication.

Damper blades shall be 20 gauge galvanized steel 2V type with double skin aero foil. Damper frame shall be 14 gauge galvanized steel. Bush shall be MS/stainless steel flange type rotating in extruded holes in the damper frame.

Damper must be rated for mounting vertically and be UL 555 rated for fire static systems. Each damper shall be supplied with TRD sensor with suitable Actuator. The basis of design is Model FSD–A –S, FSD –A–L, FSD –A–L1 & FSD–A–M.

## Damper Sizes

Minimum Size 8" W x 8.54" H
Maximum Size 72" W x 96" H

## Operation Control

Actuators: Electric 24 V
Temperature Response Device

## Options

- Retaining angles and sleeves supplied on customer demand
- Manual Reset Switch
- Open / Close Indication Switch
- ACCESS Door
- Flange on request
- SS linkages and jack shaft
- Actuators with power input of 120 V, 230 V available

## Ratings

UL555 Fire Resistance Rating: 1 ½ Hour

**UL CLASSIFIED**
UL555 Listing R27629



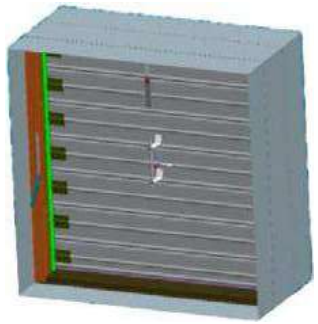
# Fire Damper- Fusible Link Operated

UL555 1½ Hour Fire Rating

Model FSD (F)-F-V-S-F90, FSD (F)-F-V-L-F90 & FSD (F)-F-V-M-F90 fire dampers are designed with 3V single skin bla-de, to be installed in static systems vertically

## Standard Construction

| | |
|---|---|
| Frame: | 1.6 mm (16 gauge) galvanized steel. Formed from four hat channel shaped piece 165 mm wide having flanges for connecting damper to sleeve. |
| Blades: | 1.6mm (16 gauge) galvanized steel, 3V groove style. |
| Linkage: | MS, concealed in jamb seal. |
| Jamb Seals: | 0.3mm thick stainless steel, flexible metal compression type. |
| Closure Device: | Helical Spring |



## Specifications

Fire dampers meeting or exceeding the following specification shall be furnished and installed at location shown on plans or as described in schedules. Dampers shall be classified for use for fire resistance rating of less than 3 hours.

Damper blade shall be 16 gauge galvanized steel 3V type with single skin. Damper frame shall be 14 gauge galvanized steel. Bush shall be flange type rotating in extruded holes in damper frame.

Damper must be rated for mounting vertically and be UL 555 rated for fire static systems. The basis of design is Model FSD (F)-F-V-S-F90, FSD (F)-F-V-L-F90 & FSD (F)-F-V-M-F90.

## Damper Sizes

Minimum Size 9.45" W X 10.24" H
Maximum Size 78.7" W X 78.7" H

## Operation Control

Fusible Link

## Options

- Retaining Angles & sleeve supplied on customer demand

## Ratings

UL555 Fire Resistance Rating: 1 ½ Hour

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UL555 Listing R27629

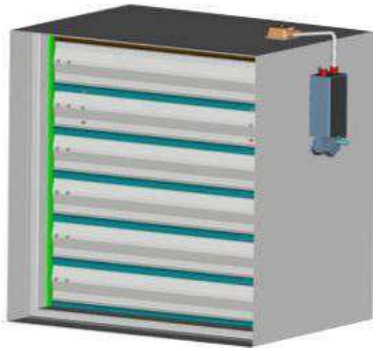
# Combination Fire & Smoke Damper- Motorized

UL555S 1½ Hour Fire Rating with Leakage Class I

Model FSD(FS)–A–L-F90–C1 and FSD(FS)–A–S-F90–C1, Combination fire & smoke damper designed with 2v double skin aero foil blade and qualified for closure in dynamic systems with velocities to 2000 fpm and pressures to 4" WC for vertical installation.

## Standard Construction

| | |
|---|---|
| Frame: | 2mm (14 gauge) galvanized steel. Formed from four hat channel shaped piece 165 mm wide having flanges for connecting damper to sleeve. |
| Blades: | 1mm (20 gauge) galvanized steel, 2V groove style |
| Linkage: | GI, concealed in frame |
| Bearings: | Flange type bearing, pressed into frame |
| Jamb Seals: | 0.3mm thick stainless steel, flexible metal compression type |
| Blade Seals: | Silicone edge type. |
| Closure Device: | Electric actuator connected with drive assembly |



## Specification

Combination fire & smoke damper meeting or exceeding the following specifications shall be furnished and installed at locations shown on plans or as described in schedules. Dampers shall be classified for use for fire resistance ratings of less than 3 hours, in accordance with UL555 and classified as Smoke Dampers in accordance with UL555S Standard. UL555S leakage rating shall be Leakage Class 1.

Dampers and their actuators shall be qualified in accordance with UL555S. Appropriate electric actuators shall be installed by the damper manufacturer at time of damper fabrication.

Damper blades shall be 20 gauge galvanized steel 2V type with double skin aero foil. Damper frame shall be 14 gauge galvanized steel. Bush shall be MS/stainless steel flange type rotating in extruded holes in the damper frame.

Damper must be rated for mounting vertically and be UL 555 rated for fire static systems. Each damper shall be supplied TRD sensor with suitable Actuator. The basis of design is Model FSD (FS)–A–L-F90–C1 and FSD (FS)–A–S-F90–C1.

## Damper Sizes

Minimum Size 8" W x 8.54" H
Maximum Size 36" W x 36" H

## Operation Control

Actuators: Electric 24 V
Temperature Response Device

## Options

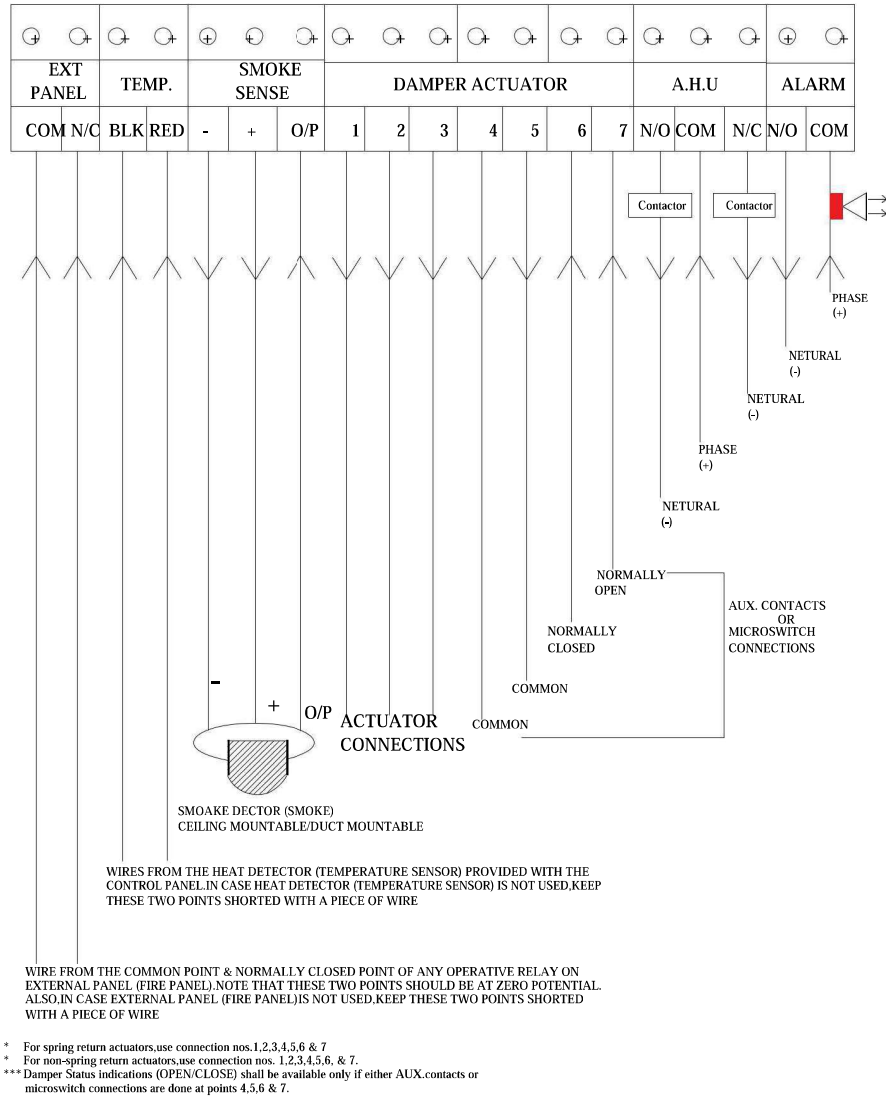
- Retaining angles & sleeves supplied on customer demand
- Manual Reset Switch
- Open / Close Indication Switch
- ACCESS Door
- Smoke Sensor
- Flange on request
- SS linkages and jack shaft
- Actuators with power input of 230 V available

## Ratings

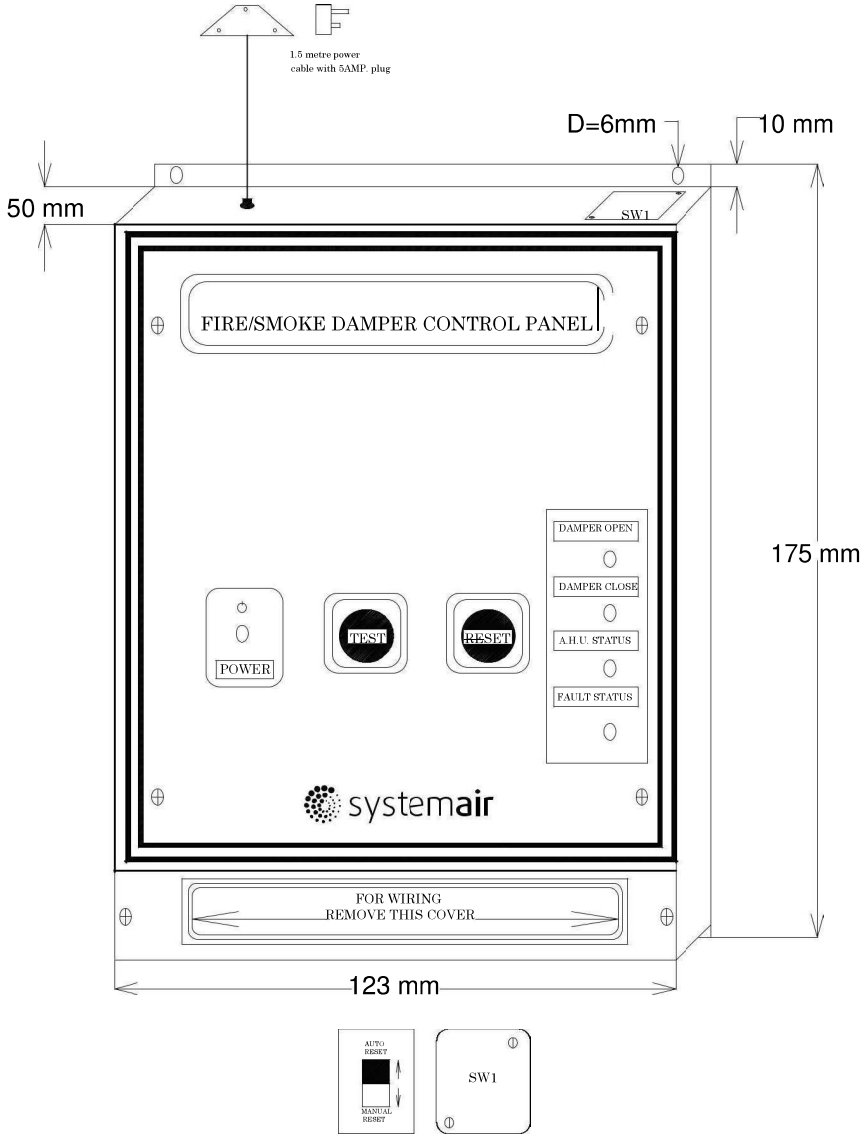
UL555S Fire Resistance Rating: 1 ½ Hour
Velocity: 2000 fpm
Pressure: 4 in. w. g.
Temperature: 250°F

**UL CLASSIFIED**
UL555 Listing R27629

# Electrical connection diagram for damper control panel




* For spring return actuators,use connection nos.1,2,3,4,5,6 & 7
* For non-spring return actuators,use connection nos. 1,2,3,4,5,6, & 7.
*** Damper Status indications (OPEN/CLOSE) shall be available only if either AUX.contacts or microswitch connections are done at points 4,5,6 & 7.



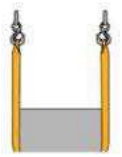
# Installation and operation instructions :

**1. Preface:**
We thank you for choosing Fire damper certified by UL for 1.5 hrs. Of fire rating as per UL555 manufactured by Systemair India Pvt. Ltd (SIPL). The purpose of this document is to give users the information about equipment components as well as wherever necessary on their installation. Reliable and long lasting operation can only be achieved through the service of a competent engineer or a technician.

**2. Safety Warning:**
Read all installation, operating and maintenance instructions thoroughly before installing or servicing this equipment. Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death.

**3. Shipping & Accepting delivery:**
Dampers are transported Ex-Works, Greater Noida/ Hyderabad. They are inspected prior to dispatch for good condition and carefully loaded in trucks. SIPL takes no responsibility for transit damages, unless the consignment is insured for transit damage by SIPL. Immediately upon receipt of material, onsite inspection should be done and any damages must be endorsed on the receiving copy of LR and the reported by mail to SIPL within 24 hrs. of receipt of material at site. SIPL will not be responsible for any damage not endorsed on LR and not reported within the time frame.

**4. Off-loading & shifting:** Special care must be taken while dampers are offloaded from the trucks. Rough handling can result in damage to sleeves / frame. Each packet must be lifted individually by placing slings, preferably nylon, around the wooden packing. It must be ensured that the slings are strong enough to take the load of each packet being lifted.



**5. Storage:**
Care must be taken to ensure that dampers are stored in a covered area without removing their packaging when storing them until the time of installation. Care must be taken to prevent exposing the dampers to avoid dust and contamination deposit on them.

**6. Pre-Installation Notes & Guidelines:**
These notes and guidelines are formulated in order to aid in completing the damper installation in a timely and efficient manner.

A. Inspect damper for damage before installing
B. Dampers must be installed free from twisting or racking
C. DO NOT compress or stretch the damper into the opening
D. DO NOT lift the damper by the blades (handle damper using frame or sleeve)
E. The damper must be protected from dirt, dust and foreign materials before and after installation
F. When painting, wall-texturing, insulating or any other foreign material is being sprayed within vicinity of the damper, the damper must be sufficiently covered and protected
G. Suitable access inside the duct and to the damper must be created for inspection and service of the damper

**7. Basic Installation Details:**
Below points covers the requirements of UL555 standard in order to correctly choose the installation types / Methods:

A. Type of wall for dampers to be installed upon: The dampers are to be installed on a Masonry Wall.
B. Clearances required on Top & sides for expansion: 6.3mm per Feet length
C. Type of Installation: The dampers covered in this IOM are for Vertical Installation.

**8. Sleeve Details:**
Sleeve is a mandatory requirement for installation of UL555 certified fire dampers. SIPL offers factory fitted sleeves as well as they can be installed on site (supplied by customer), provided below requirements are met:

A. Sleeve Material: Galvanized Sheet Steel having mini-mum 180 GSM coating.
B. Sleeve Thickness: Following table gives thicknesses of sleeves which depends on damper size.

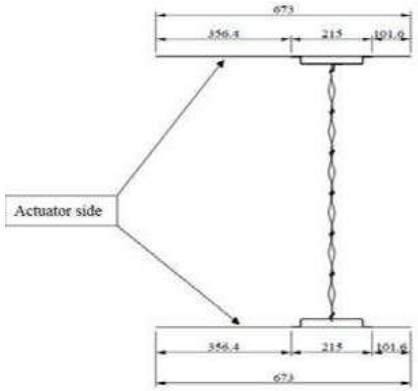
For deciding the sleeve thickness, higher among the two dimensions (Height or Width) shall be considered.

C. Sleeve Length:

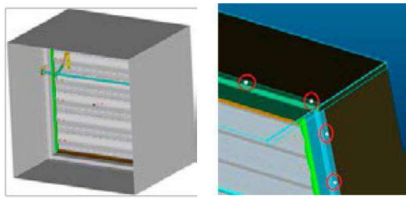
| Damper Height or Width (mm) | Sleeve Thickness (mm) |
|---|---|
| ≤ 762 | 0.6 |
| 763 to 1372 | 0.8 |
| 1373 to 2438 | 1.0 |

Sleeve thickness must be equal to or thicker than the duct connected to it.
Sleeve gauge required are listed in SMACNA fire , smoke and radiation damper installation guide for HVAC sys-tems and in NFPA 90A.sleeve must not exceed in length out of the wall as follows:-
i) Six inches (152.4) on each side for fire dampers intended to be installed in the plane of a fire barrier and for use without an actuator or a factory installed access door in the sleeve.
ii) Six inches (152.4) on one side and 16 in (406.4mm) on the opposite side for fire dampers intended for use with an actuator and/or a factory installed access door on the longer side.
iii) Sixteen inches (406.4mm) on each side and fir fire dampers intended for use with an actuator on one side and a factory installed access door on the other side.
iv) Six inches (152.4mm) on one side and sixteen in (406.4mm) on damper side for fire dampers intended to be installed outside of wall on floor plane.
v) For sleeve gauge thickness – Refer NFPA 90(A) Table 3-4.6.3, where the sleeve gauge thickness mentioned according to the damper size (width / length).The mate-rial is of Galvanized Sheet Steel.

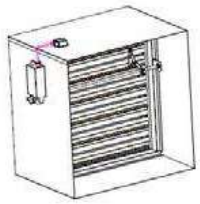
The image below shows sleeve length and its dimension from both ends of damper manufactured by SIPL.




**9. Damper Frame & Sleeve Attachment:**
For attaching the damper frame and sleeve; Self drilling screw of Ø3.9 x13 mm size are used. The first screw from any corner is made at 45 mm and all intermediate rivets have a maximum pitch of 80 mm. The locations are indicated by circles in below picture.

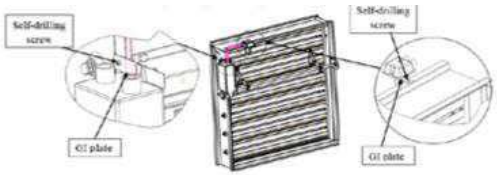


**10. Actuator & TRD Sensor Mounting :**
A. For factory fitted sleeve: Below image shows position of factory fitted actuator & TRD sensor.

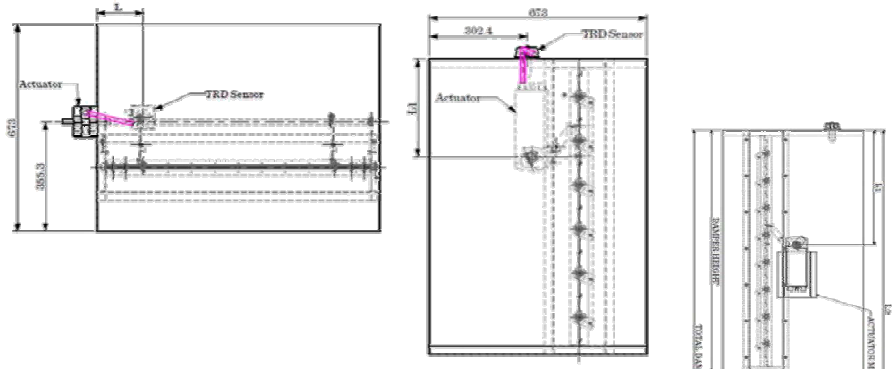


B. For sleeves to be installed on site (Sleeve not supplied by SIPL):- To mount actuator & TRD sensor follow-ing step are to be followed:

1. Damper will be received from SIPL as shown in below image. The actuator and TRD will be fixed on GI plate using self-drilling screws.




2. Unmount Actuator & TRD sensor from GI Plate by unscrewing the self-drilling screws.
3. Holes for mounting actuator & TRD sensor on sleeve needs to be done as per below table.
4. Using details mentioned in Contents No. 9 of this IOM, Connect the sleeve to damper frame.



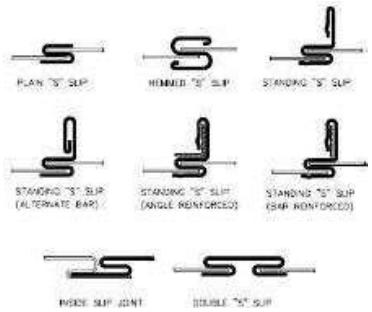

| S. No | Annotation | Annotation Description | Damper Width (mm) | Damper Height (mm) | Distance (mm) | Hole Dia.(mm) |
|---|---|---|---|---|---|---|
| 1 | L | Distance from Outside sleeve surface to TRD sensor. | 217 ≤ 300 | 217 ≤ 1219 | 103 | 48 |
| | | | >300 ≤ 1830 | | 156 | |
| 2 | L1 | Distance from Inside sleeve surface to Actuator Shaft hole center. | 203 ≤ 1830 | 217 < 300 | 119 | 24 |
| | | | | >300 < 400 | 131.5 | |
| | | | | >400 < 1048 | 304 | |
| | | | | >1048 < 1219 | 578 | |
| 3 | L2 | Distance from Inside sleeve surface to Actuator Shaft hole center. | 203 ≤ 1830 | 810 to ≤ 1048 | Damper height + 304mm | 24 |
| | | | | >1048 to ≤ 2438 | Damper height + 578mm | |

5. Use two 3.9x13mm self-drilling screws to secure TRD sensor with sleeve.
6. Mount to Actuator with the help of Actuator mounting plate & self-drilling screw 4.2 X 19mm.Fix Actuator Mount-ing plate with the help of Self Drilling Screw 3.9 X 13mm.


Note: TRD Sensor will be common for all the actuator(s) connect with the damper.

**11. Damper Sleeve & Duct Connection:**

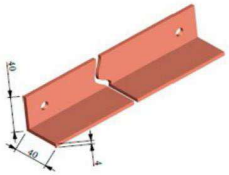
It is mandatory that the ducts terminate at sleeves. Continuous ducts over the fire damper are not allowed.
Any one of the following Duct – sleeve connection needs to be followed.

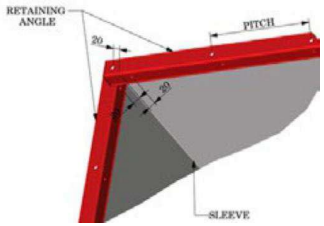





12. Retaining angles:

Retaining angles are mounted on perimeter of damper's sleeve. The angles shall be made of M.S. material having size of 40 x 40 x 4 mm. See below picture.

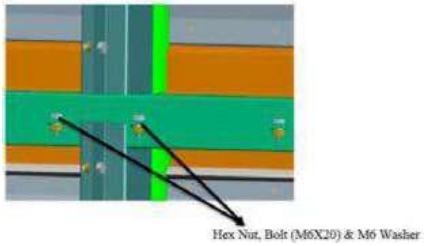





Mounting of retaining angles should be as shown in figure above. Holes of dia. 8.5 mm shall be made in the angles. The first hole for joining the angles to sleeve shall be made such that it falls at a distance of 20mm from corner of sleeve. M8 Hex Nut & Bolt (MS Material) should be used to secure the retaining angle with sleeve. Hole to hole pitch should be equidistant but not exceeding 210 mm.

**13.Assembly of Multiple fire dampers:**

Method of attaching individual sections together: Two individual sections are attached together using Hex Bolt M6X20, Hex Nut M6 & Flat washer (as shown in below figures). The holes to join the section together are made at factory.




**14. After-sales service:**

Our after-sales service is at your disposal under the following contact details:

Head Office

Service.HO@systemair.in Service@systemair.in Homepage: www.systemair.com

Regional Sales Offices

| Delhi/NCR | Kolkata | Bengaluru | Mumbai |
|---|---|---|---|
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www.systemair.com

Spring return actuator with emergency function for adjusting air dampers in ventilation and air conditioning systems in buildings

- For air dampers up to approx. 4 m²
- Torque 20 Nm
- Nominal voltage
  AC 24 ... 240 V / DC 24 ... 125 V
- Control: Open-close

## Technical data

| | | |
|---|---|---|
| Electrical data | Nominal voltage | AC 24 ... 240 V, 50/60 Hz / DC 24 ... 125 V |
| | Nominal voltage range | AC 19,2 ... 264 V / DC 21,6 ... 137,5 V |
| | Power consumption In operation<br>At rest<br>For wire sizing | 7 W @ nominal torque<br>3.5 W<br>18 VA |
| | Connection | Cable 1 m, 2 x 0.75 mm² |
| Functional data | Torque Motor<br>Spring return | Min. 20 Nm @ nominal voltage<br>Min. 20 Nm |
| | Direction of rotation | Can be selected by mounting L / R |
| | Manual override | With hand crank and interlocking switch |
| | Angle of rotation | Max. 95°, can be limited with adjustable mechanical end stop |
| | Running time Motor<br>Spring return | ≤75 s (0 ... 10 Nm)<br>20 s @ –20 ... 50°C / max. 60 s @ –30°C |
| | Sound power level Motor<br>Spring return | ≤45 dB (A)<br>≤62 dB (A) |
| | Service life | Min. 60,000 emergency positions |
| | Position indication | Mechanical |
| Safety | Protection class | II Totally insulated |
| | Degree of protection | IP54<br>NEMA2, UL Enclosure Type 2 |
| | EMC<br>Low-voltage directive | CE according to 2004/108/EC<br>CE according to 2006/95/EC |
| | Certification | Certified to IEC/EN 60730-1 and IEC/EN 60730-2-14<br>cULus according to UL 60730-1A and UL 60730-2-14 and CAN/CSA E60730-1:02 |
| | Mode of operation | Type 1.AA |
| | Rated impulse voltage | 4 kV |
| | Control pollution degree | 3 |
| | Ambient temperature | –30 ... +50°C |
| | Non-operating temperature | –40 ... +80°C |
| | Ambient humidity | 95% r.h., non-condensating |
| | Maintenance | Maintenance-free |
| Dimensions / Weight | Dimensions | See «Dimensions» on page 3 |
| | Weight | Approx. 2.2 kg |

## Safety notes

- The actuator is not allowed to be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
- Caution: Power supply voltage possible!
- It may only be installed by suitably trained personnel. Any legal regulations or regulations issued by authorities must be observed during assembly.
- The device may only be opened at the manufacturer's site. It does not contain any parts that can be replaced or repaired by the user.
- The cable must not be removed from the device.
- When calculating the required torque, the specifications supplied by the damper manufacturers (cross-section, design, installation site), and the air flow conditions must be observed.
- The device contains electrical and electronic components and is not allowed to be disposed of as household refuse. All locally valid regulations and requirements must be observed.

## Product features

**Mode of operation**
The actuator is equipped with a universal power module and can process supply voltages from AC 24 ... 240 V plus DC 24 ... 125 V.
The actuator moves the damper to the operating position at the same time as tensioning the return spring. The damper is turned back to the emergency position by spring force if the supply voltage is interrupted.

**Simple direct mounting**
Simple direct mounting on the damper spindle with a universal spindle clamp, supplied with an anti-rotation strap to prevent the actuator from rotating.

**Manual override**
Manual operation of the damper with the hand crank, locking in any position with the interlocking switch. Unlocking is manual or automatic by applying the operating voltage.

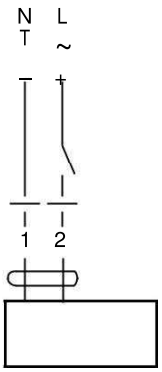
**Adjustable angle of rotation**
Adjustable angle of rotation with mechanical end stop.

**High operational reliability**
The actuator is overload-proof, requires no limit switches and automatically stops when the end stop is reached.

## Electrical installation

**Wiring diagram**

Notes
- Caution: Power supply voltage possible!
- Parallel connection of other actuators possible. Note the performance data.




Cable colours:
1 = blue
2 = brown

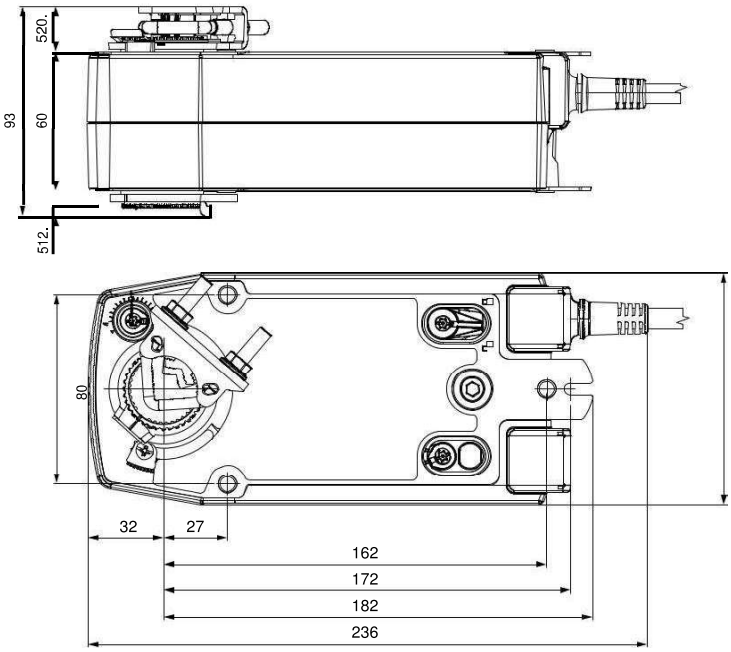
## Accessories

| | Description | Data sheet |
|---|---|---|
| Electrical accessories | Auxiliary switch unit S2A-F *□ | T2 - S2A-F |
| | Feedback potentiometer unit P200A-F *□ | T2 - P200A-F |
| Mechanical accessories | Various accessories | |

* further versions on request

## Dimensions [mm]

Dimensional drawings




Variant 1a:
¾“-spindle clamp (with insertion part) EU

| Standard Damper spindle | Length | | | |
|---|---|---|---|---|
| | ≥85 | 10 ... 22 | 10 | 14 ... 25.4 |
| | ≥15 | | | |

Variant 1b:
1“-spindle clamp (without insertion part) EU Standard

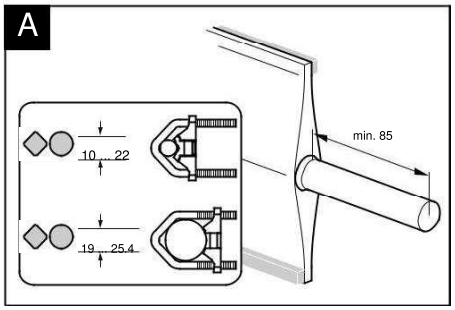
| Damper spindle | Length | | |
|---|---|---|---|
| | ≥85 | 19 ... 25.4 (26.7) | 12 ... 18 |
| | ≥15 | | |

Variant 2:
½“-spindle clamp (optional via configuration)

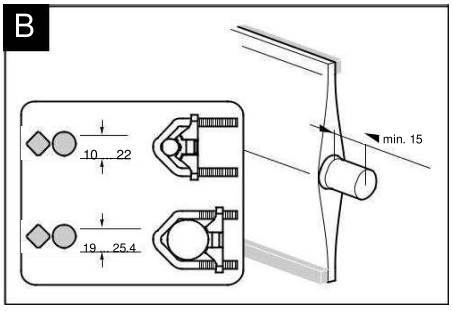
| Damper spindle | Length | | |
|---|---|---|---|
| | ≥85 | 10 ... 19 | 14 ... 20 |
| | ≥15 | | |

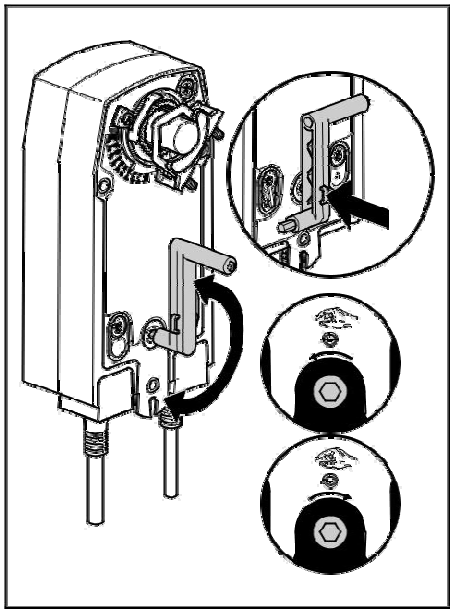
71127-00001.F

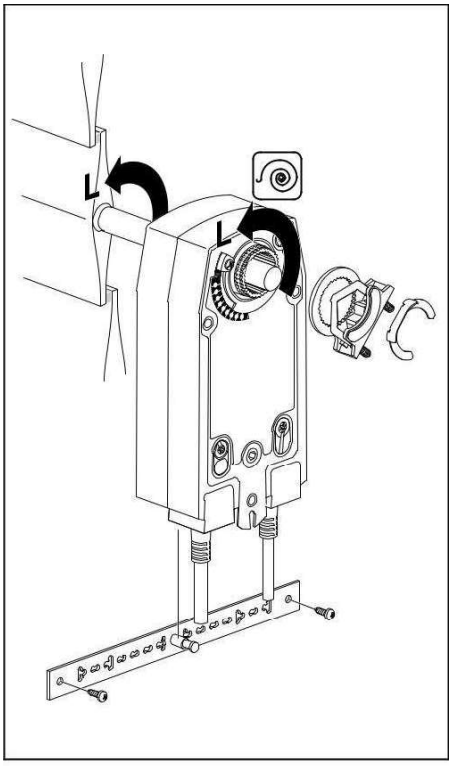
A

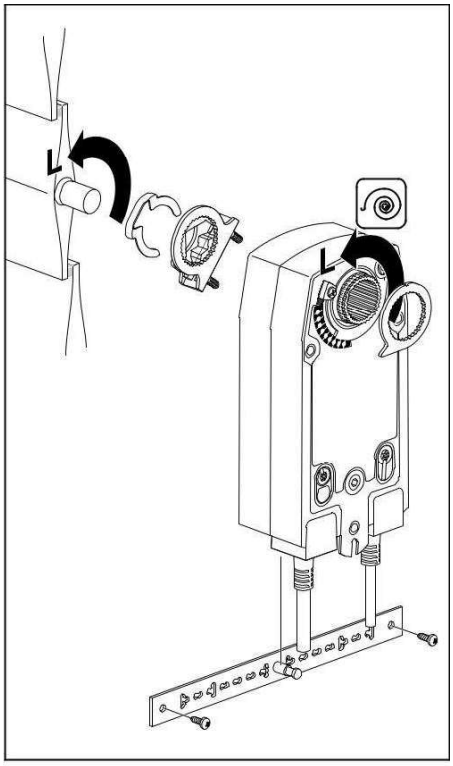


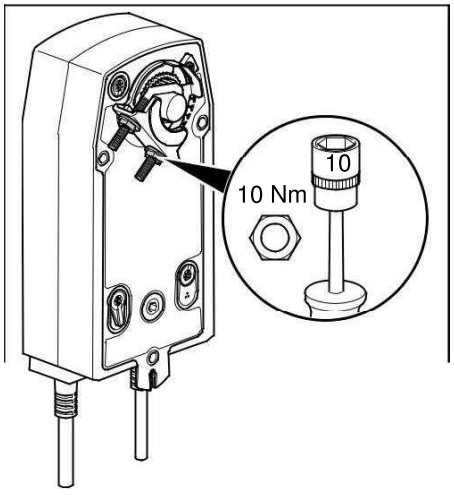

B

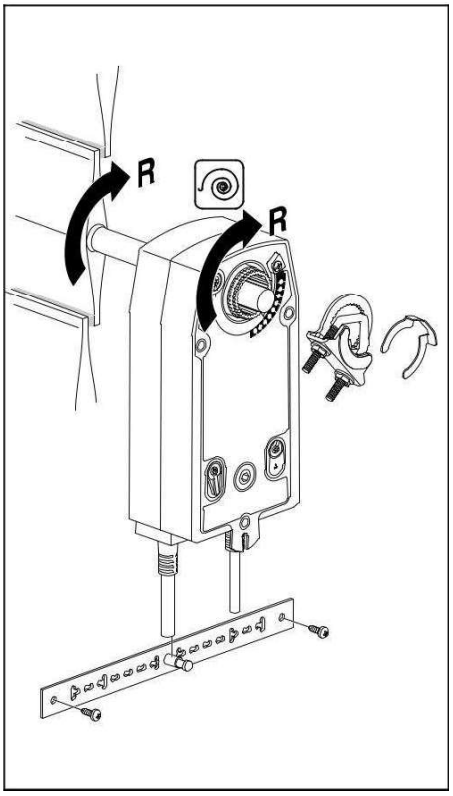


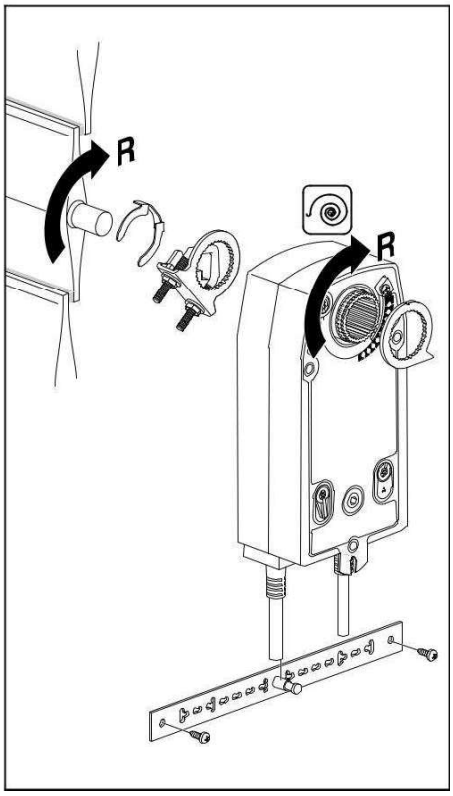



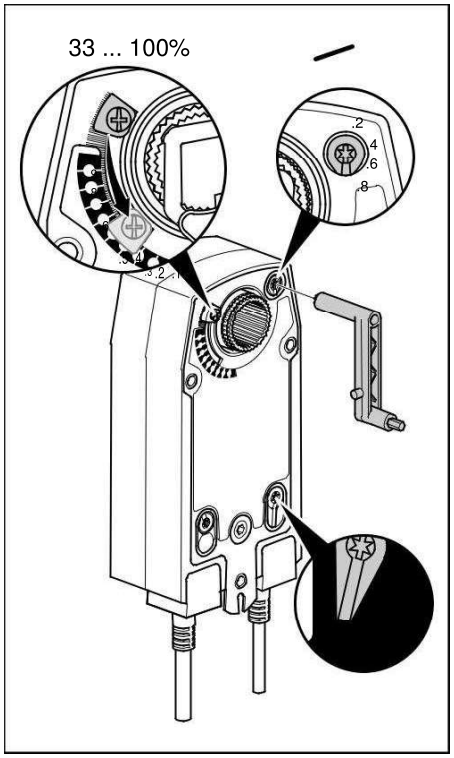


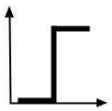



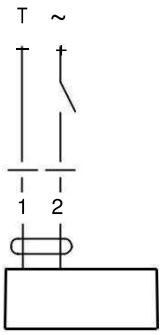



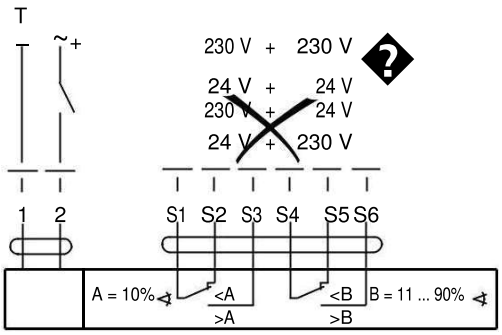





AC 24 V / DC 24 V

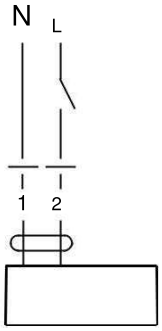



NF24A
SF24A

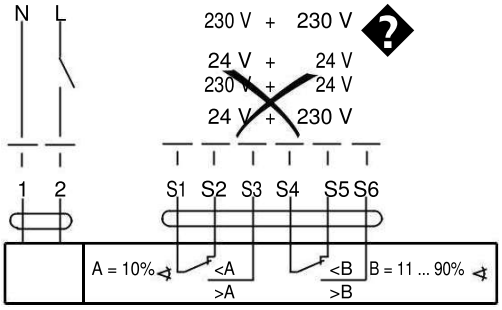



NF24A-S2
SF24A-S2

AC 230 V ⚠

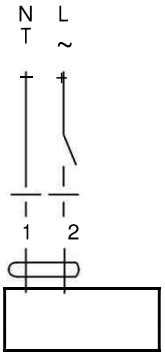



NF230A
SF230A

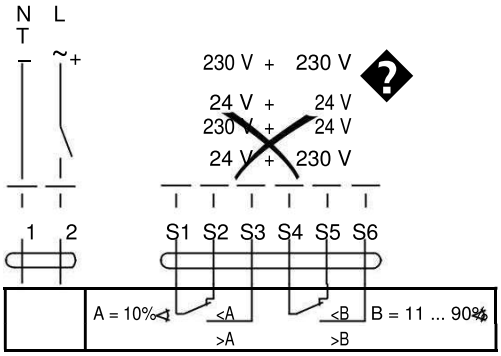



NF230A-S2
SF230A-S2

AC 24 ... 240 V / DC 24 ... 125 V ⚠ !

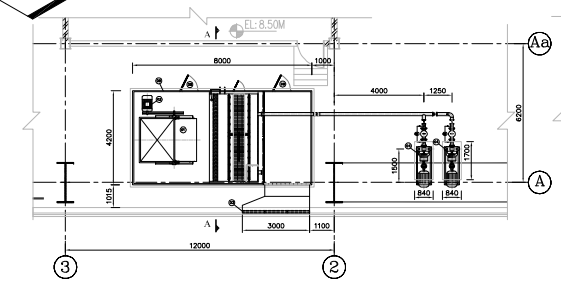



NFA
SFA

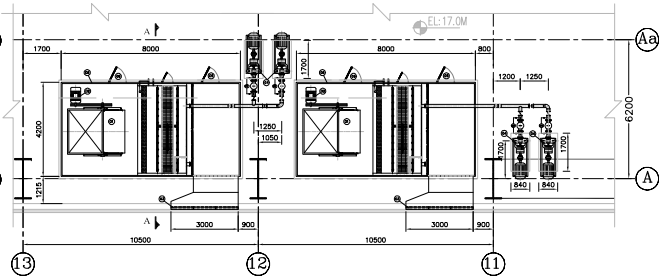



NFA-S2
SFA-S2

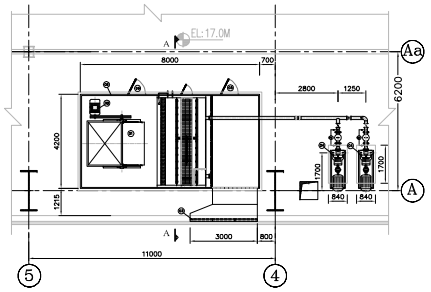
NORTH



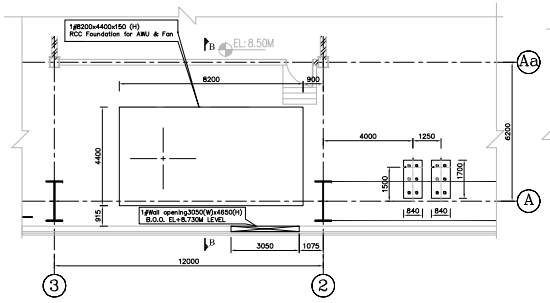
AIR WASHER UNIT PLAN AT EL +8.50M LVL UNIT-1



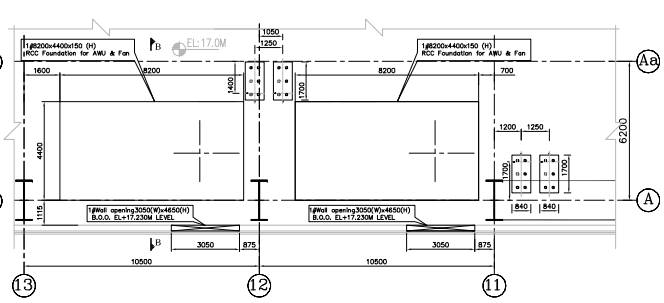
AIR WASHER UNIT PLAN AT EL +17.0M LVL UNIT-1



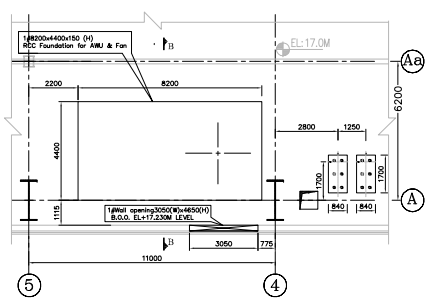
AIR WASHER UNIT PLAN AT EL +17.0M LVL UNIT-1



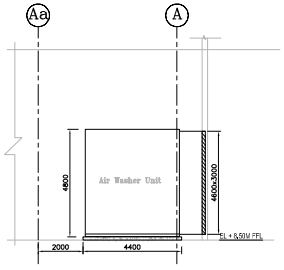
FOUNDATION LAYOUT OF AIR WASHER UNIT EL + 8.50M LVL UNIT-1



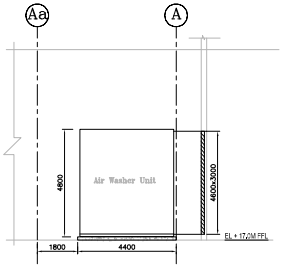
FOUNDATION LAYOUT OF AIR WASHER UNIT EL + 17.0M LVLUNIT-1



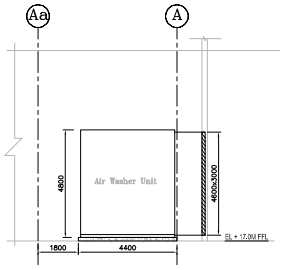
FOUNDATION LAYOUT OF AIR WASHER UNIT EL + 17.0M LVL UNIT-1



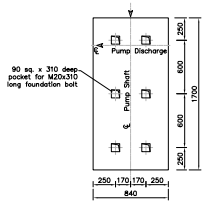
SECTION A-A



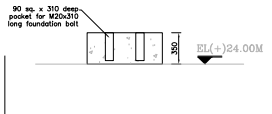
SECTION A-A



SECTION A-A

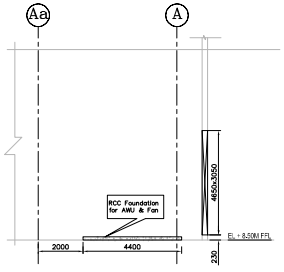


PLAN

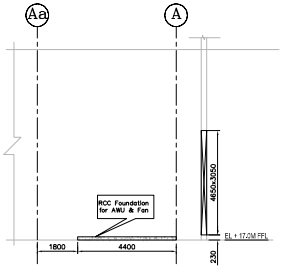


ELEVATION

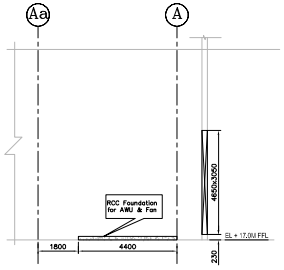
PUMP FOUNDATION (TYPICAL)



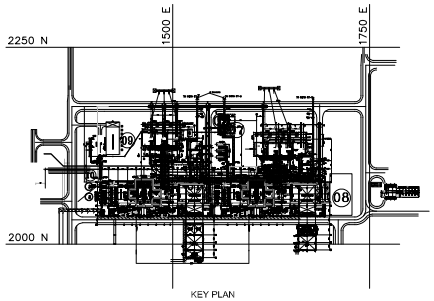
SECTION B-B



SECTION B-B



SECTION B-B




KEY PLAN

BHEL REFERENCE DOCUMENTS / DRAWINGS

| DOCUMENT / DRAWING NO | DOCUMENT / DRAWING TITLE |
|---|---|
| MAITREE-00-UMA-LH-104011-PEM | POWER HOUSE BUILDING ARCHITECTURAL FLOOR PLAN AT EL(+)8.50M |
| MAITREE-00-UMA-LH-100091-PEM | POWER HOUSE BUILDING ARCHITECTURAL FLOOR PLAN AT EL(+)17.00M |
| PE-V0-421-554-A009 | TDS & GA FOR AIR WASHER & UAF WITH FAN & PUMP FOUNDATION DETAILS FOR VENTILATION SYSTEM, |

NOTES:

1. ALL EQUIPMENTS SHALL BE DESIGNED FOR CONTINUOUS DUTY.
2. ALL DIMENSIONS ARE IN MM, AND ELEVATIONS ARE IN MTRS. UNLESS OTHERWISE STATED.
3. TOTAL QTY. OF AIR WASHER UNIT LOCATED AT 'A' ROW SIDE UNIT # 1 ARE FOUR (4) NOS.
4. ALL SLAB/ROOF OPENINGS, AWU FOUNDATION AND MUMTY FOR INTAKE LOUVERS SHALL BE DONE BY BHEL.

| SUPPLY AIR FAN (1 x 100% capacity) | |
|---|---|
| AIR FLOW CAPACITY | : 125,000 CMH |
| FAN STATIC PRESSURE | : 75 mmWC. |
| WATER PUMP (2 x 100% capacity) | |
| WATER FLOW CAPACITY | : 125 CMH |
| HEAD | : 30 Mtr. |

**OPERATING LOAD OF AWU INCLUDING WATER : 19500 Kg. (Each)**

BILL OF QUANTITY

| PART NO. | DESCRIPTION | SIZE | QTY. | MAT'LS/MAKE |
|---|---|---|---|---|
| 01. | SUPPLY AIR FAN | AdLD-137 | 1 no. | – |
| 02. | MOTOR 45 kw/4 POLE | – | 1 no. | – |
| 03. | FRESH AIR INTAKE LOUVERS WITH BIRDMESH | 3000x4500 | 1 set | GSS |
| 04. | WATER RE CIRCULATING PUMP | F 5625 | 2 nos. | – |
| 05. | AIR TIGHT DOOR (Outside openable) | 750x2100 (ht.) | 2 nos. | CRC |
| 06. | DOUBLE SKIN ENCLOSER | 8000x4200x4800 ht. | 1 no. | GSS |

PROJECT: **2x660MW MAITREE SUPER THERMAL POWER PROJECT, RAMPAL, BANGLADESH (EPC MAIN PLANT PACKAGE)**

OWNER CONSULTANT:
FICHTNER
M/s FICHTNER GmbH & Co KG,
Stuttgart,GERMANY

OWNER:
BANGLADESH-INDIA FRIENDSHIP POWER COMPANY (PVT.) LIMITED, BANGLADESH

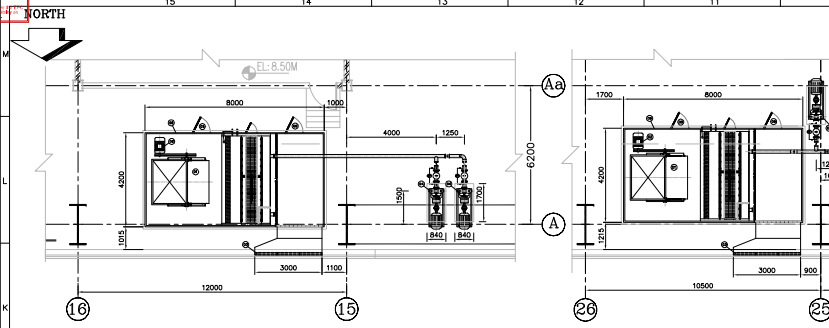
BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECTS ENGINEERING MANAGEMENT
NOIDA

SCALE: –
SHEET 1 OF 2

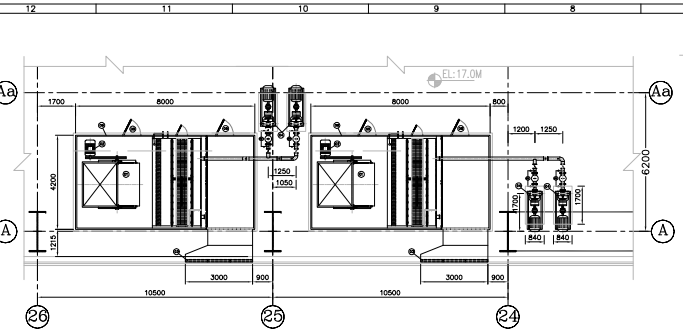
TITLE: AIR WASHER LAYOUT OUTSIDE "A ROW" SIDE ALONG WITH FOUNDATION DETAILS – TG BUILDING

| SIZE: | PROJECT NO.: 421 | FILE NO: |
|---|---|---|
| ANNEX: | MAITREE-00-SAD-TC-111021-PEM | Rev-02 |
| | BHEL DWG NO : PE-V0-421-554-A022 | |

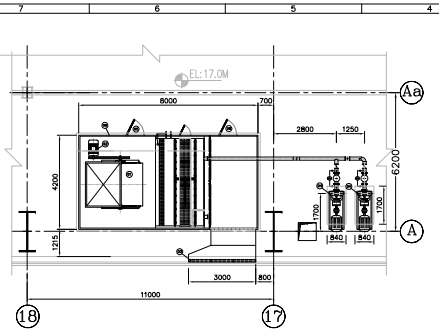
SIZE-A1



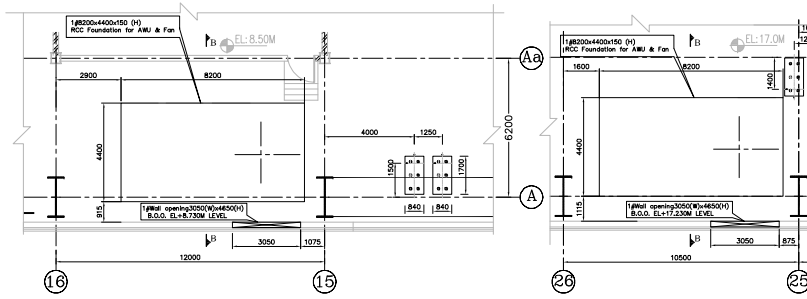

AIR WASHER UNIT PLAN AT EL +8.50M LVL UNIT-2



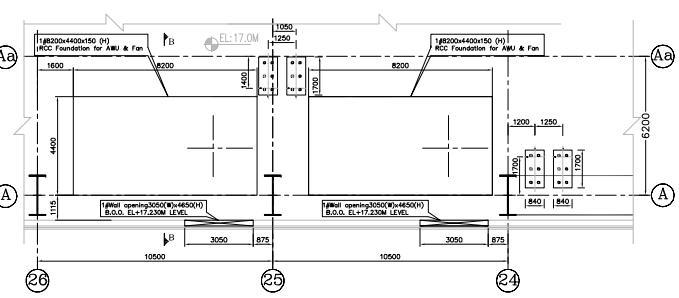

AIR WASHER UNIT PLAN AT EL +17.0M LVL UNIT-2



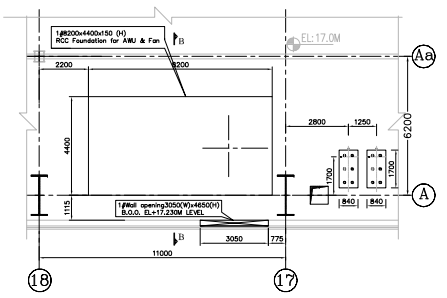

AIR WASHER UNIT PLAN AT EL +17.0M LVL



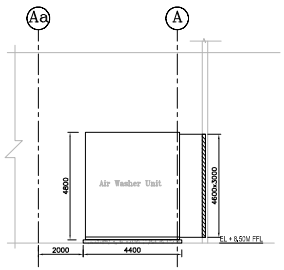

FOUNDATION LAYOUT OF AIR WASHER UNIT EL + 8.50M LVL UNIT-2



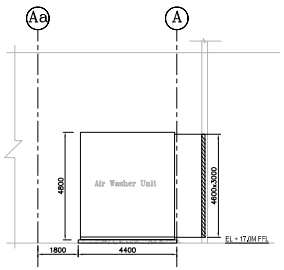

FOUNDATION LAYOUT OF AIR WASHER UNIT EL + 17.0M LVL UNIT-2



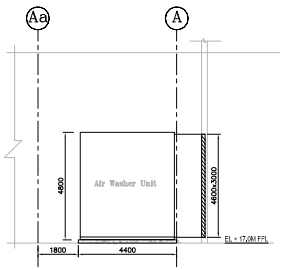

FOUNDATION LAYOUT OF AIR WASHER UNIT EL + 17.0M LVL UNIT-2



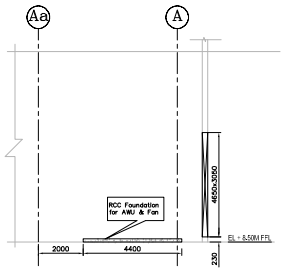

SECTION A-A



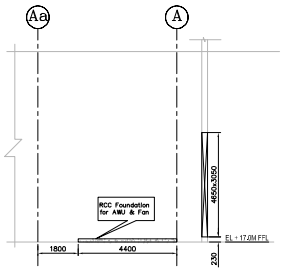

SECTION A-A



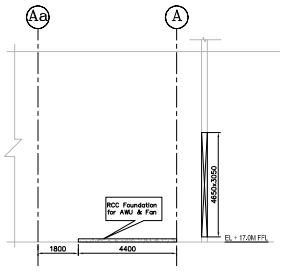

SECTION A-A



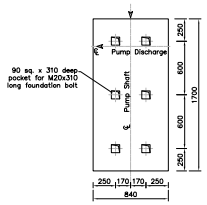

SECTION B-B



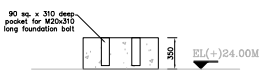

SECTION B-B




SECTION B-B

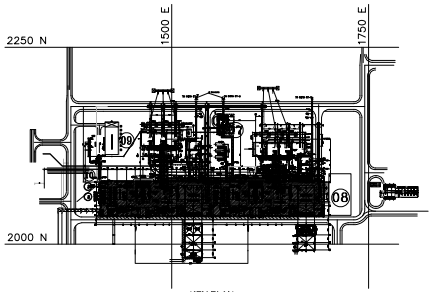



PLAN




ELEVATION

PUMP FOUNDATION (TYPICAL)




BHEL REFERENCE DOCUMENTS / DRAWINGS

| DOCUMENT / DRAWING NO | DOCUMENT / DRAWING TITLE |
|---|---|
| MAITREE-00-UMA-LH-104011-PEM | POWER HOUSE BUILDING ARCHITECTURAL FLOOR PLAN AT EL(+)9.50M |
| MAITREE-00-UMA-LH-100091-PEM | POWER HOUSE BUILDING ARCHITECTURAL FLOOR PLAN AT EL(+)17.00M |
| PE-V0-421-554-A009 | TDS & GA FOR AIR WASHER & UAF WITH FAN & PUMP FOUNDATION DETAILS FOR VENTILATION SYSTEM, |

NOTES:

1. ALL EQUIPMENTS SHALL BE DESIGNED FOR CONTINUOUS DUTY.
2. ALL DIMENSIONS ARE IN MM, AND ELEVATIONS ARE IN MTRS. UNLESS OTHERWISE STATED.
3. TOTAL QTY. OF AIR WASHER UNIT LOCATED AT 'A' ROW SIDE UNIT # 1 ARE FOUR (4) NOS.
4. ALL SLAB/ROOF OPENINGS, AWU FOUNDATION AND MUMTY FOR INTAKE LOUVERS SHALL BE DONE BY BHEL.

| SUPPLY AIR FAN (1 x 100% capacity) | |
|---|---|
| AIR FLOW CAPACITY | : 125,000 CMH |
| FAN STATIC PRESSURE | : 75 mmWC. |
| **WATER PUMP (2 x 100% capacity)** | |
| WATER FLOW CAPACITY | : 125 CMH |
| HEAD | : 30 Mtr. |

**OPERATING LOAD OF AWU INCLUDING WATER : 19500 Kg. (Each)**

BILL OF QUANTITY

| PART NO. | DESCRIPTION | SIZE | QTY. | MAT'LS/MAKE |
|---|---|---|---|---|
| 01. | SUPPLY AIR FAN Arr : Y(s)-C2 | AdLD-137 | 1 no. | – |
| 02. | MOTOR 45 kw/4 POLE | – | 1 no. | – |
| 03. | FRESH AIR INTAKE LOUVERS WITH BIRDMESH | 3000x4500 | 1 set | GSS |
| 04. | WATER RE CIRCULATING PUMP | F 5625 | 2 nos. | – |
| 05. | AIR TIGHT DOOR (Outside openable) | 750x2100 (ht.) | 2 nos. | CRC |
| 06. | DOUBLE SKIN ENCLOSER | 8000x4200x4800 ht. | 1 no. | GSS |

PROJECT: **2x660MW MAITREE SUPER THERMAL POWER PROJECT, RAMPAL, BANGLADESH (EPC MAIN PLANT PACKAGE)**

OWNER CONSULTANT:
FICHTNER
M/s FICHTNER GmbH & Co KG,
Stuttgart,GERMANY

OWNER:
BANGLADESH-INDIA FRIENDSHIP POWER COMPANY (PVT.) LIMITED, BANGLADESH

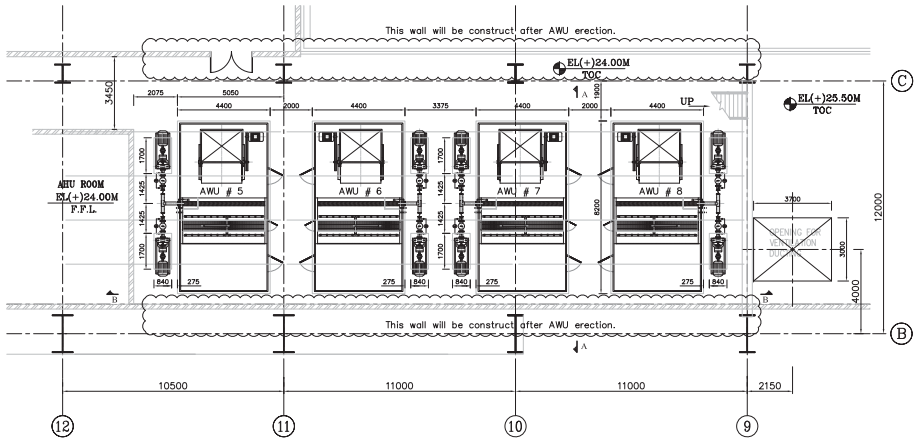
BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECTS ENGINEERING MANAGEMENT
NOIDA

SCALE: –
SHEET 2 OF2

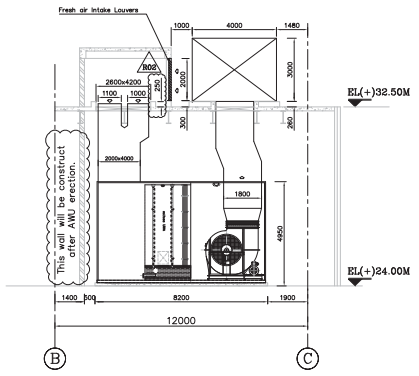
TITLE: AIR WASHER LAYOUT OUTSIDE "A ROW" SIDE ALONG WITH FOUNDATION DETAILS – TG BUILDING

SIZE: | PROJECT NO.: 421 | FILE NO:
ANNEX: | MAITREE-00-SAD-TC-111021-PEM | Rev-02
BHEL DWG NO : PE-V0-421-554-A022

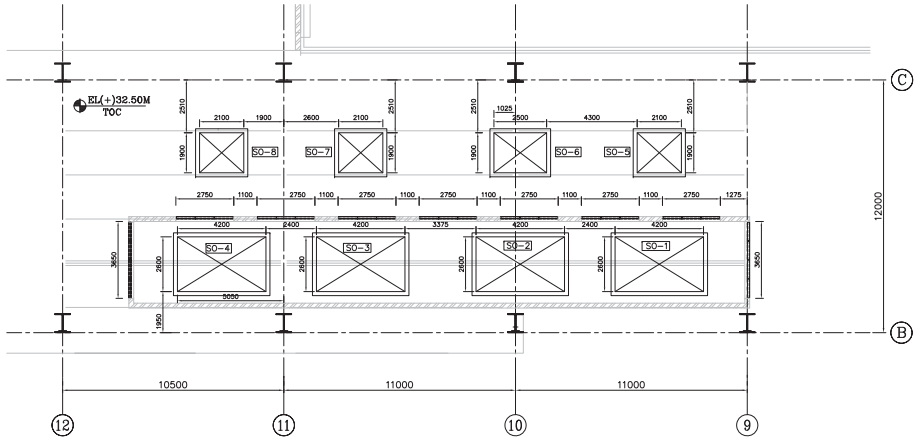
SIZE-A1



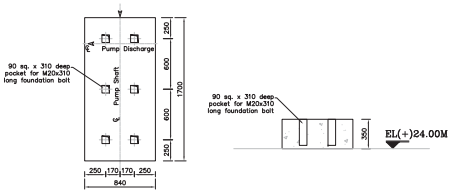

AIR WASHER UNIT PLAN AT EL +24.00M LVL




SECTION - A A

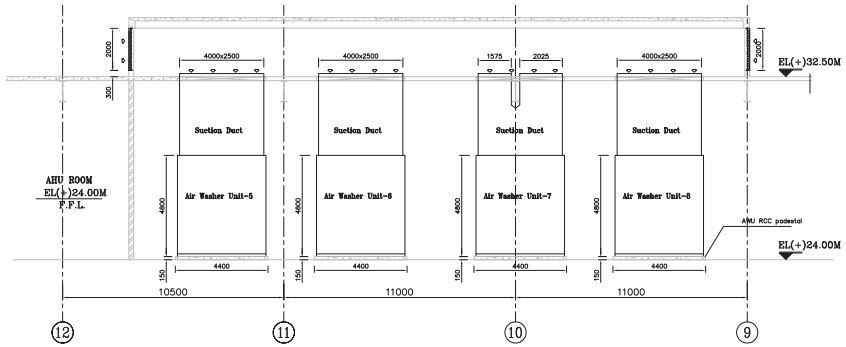



ROOF / SLAB OPENING PLAN AT EL +32.50M LVL

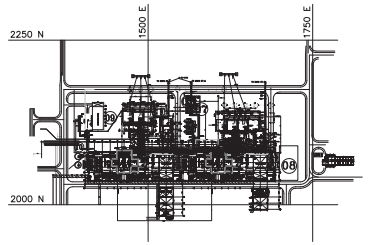



PLAN ELEVATION

PUMP FOUNDATION (TYPICAL)




SECTION - B B




BHEL REFERENCE DOCUMENTS / DRAWINGS

| DOCUMENT / DRAWING NO | DOCUMENT / DRAWING TITLE |
|---|---|
| MAITREE-00-UMA-C-103312-PEM | POWER HOUSE BUILDING FRAMING PLAN @ EL.24.00M FFL. |
| MAITREE-00-UMA-C-103612-PEM | POWER HOUSE BUILDING FRAMING PLAN @ EL.24.00M FFL. & 37.5M TOS |
| MAITREE-00-UMA-CH-100291-PEM | POWER HOUSE BUILDING ARCHITECTURAL FLOOR PLAN AT EL 24.00M. |
| PE-V0-421-554-A009 | TDS & GA FOR AIR WASHER & UAF WITH FAN & PUMP FOUNDATION DETAILS FOR VENTILATION SYSTEM. |

NOTES:

1. ALL EQUIPMENTS SHALL BE DESIGNED FOR CONTINUOUS DUTY.
2. ALL DIMENSIONS ARE IN MM, AND ELEVATIONS ARE IN MTRS. UNLESS OTHERWISE STATED.
3. TOTAL QTY. OF AIR WASHER UNIT LOCATED AT EL 24.00M LVL. UNIT # 1 ARE FOUR (4) NOS.
4. ALL SLAB/ROOF OPENINGS, AWU FOUNDATION AND MUNTY FOR INTAKE LOUVERS SHALL BE DONE BY BHEL.

| SUPPLY AIR FAN (1 x 100% capacity) | |
|---|---|
| AIR FLOW CAPACITY | : 125,000 CMH |
| FAN STATIC PRESSURE | : 75 mmWC. |
| WATER PUMP (2 x 100% capacity) | |
| WATER FLOW CAPACITY | : 125 CMH |
| HEAD | : 30 Mtr. |

**OPERATING LOAD OF AWU INCLUDING WATER : 19500 Kg. (Each)**

ROOF / SLAB OPENING SCHEDULE FOR UNIT -1

| S.No | Legend | Location | Opening Size | Floor level |
|---|---|---|---|---|
| 1. | SO-1 | B - C bay Grid - 9 & 10 | 4200 x 2600 | 32.50M |
| 2. | SO-2 | B - C bay Grid - 10 | 4200 x 2600 | 32.50M |
| 3. | SO-3 | B - C bay Grid - 10 & 11 | 4200 x 2600 | 32.50M |
| 4. | SO-4 | B - C bay Grid - 11 & 12 | 4200 x 2600 | 32.50M |
| 5. | SO-5 | B - C bay Grid - 9 & 10 | 2100 x 1900 | 32.50M |
| 6. | SO-6 | B - C bay Grid - 10 | 2500 x 1900 | 32.50M |
| 7. | SO-7 | B - C bay Grid - 10 & 11 | 2100 x 1900 | 32.50M |
| 8. | SO-8 | B - C bay Grid - 11 & 12 | 2100 x 1900 | 32.50M |

PROJECT: 2x660MW MAITREE SUPER THERMAL POWER PROJECT, RAMPAL, BANGLADESH (EPC MAIN PLANT PACKAGE)

OWNER CONSULTANT:
FICHTNER
M/s FICHTNER GmbH & Co KG, Stuttgart,GERMANY

OWNER:
BANGLADESH-INDIA FRIENDSHIP POWER COMPANY (PVT.) LIMITED, BANGLADESH

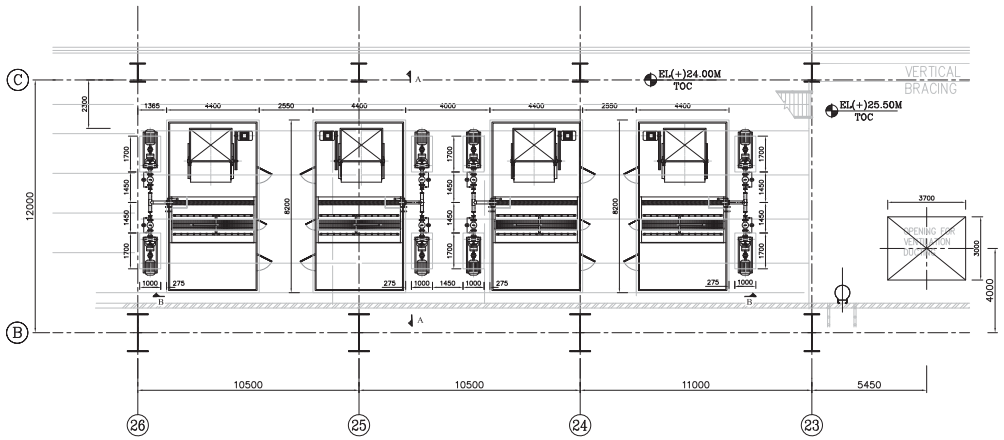
BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECTS ENGINEERING MANAGEMENT
NOIDA

SCALE: 1 : 40
SHEET 1 OF 2

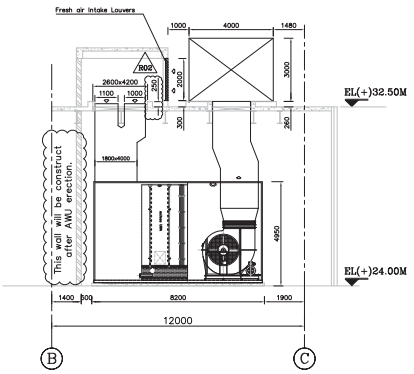
TITLE: AIR WASHER LAYOUT FOR B - C BAY SIDE ALONG WITH FOUNDATION DETAILS - T G BUILDING.

SIZE: PROJECT NO.: 421 FILE NO:
ANNEX: MAITHEE-00-SAD-TC-111922-PEM Rev-02
BHEL DWG NO : PE-V0-421-554-A023

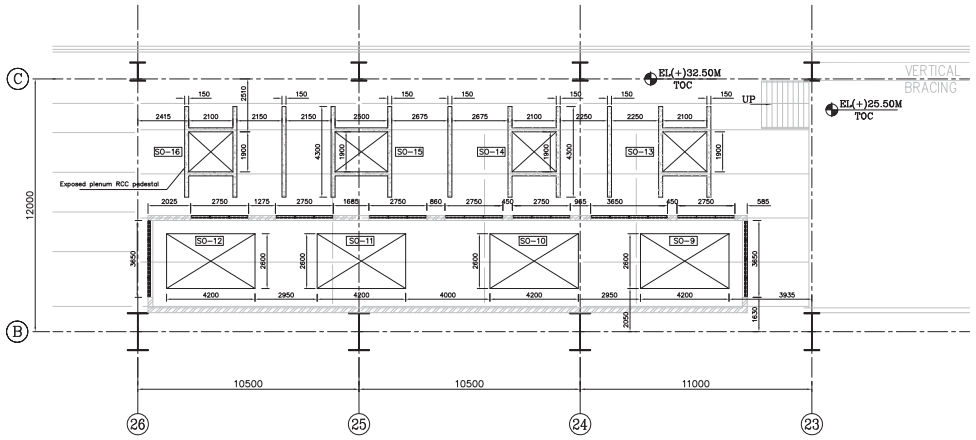
SIZE-A1



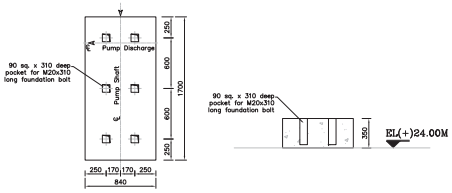

AIR WASHER UNIT PLAN AT EL +24.00M LVL




SECTION - A A

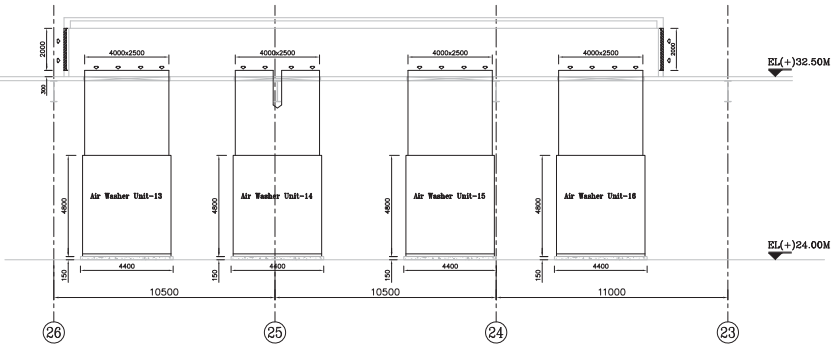



ROOF OPENING PLAN AT EL +32.50M LVL

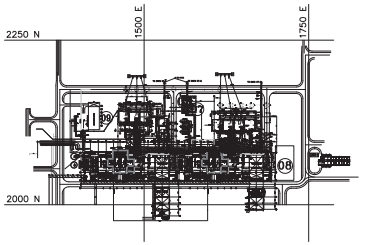



PLAN ELEVATION

PUMP FOUNDATION (TYPICAL)




SECTION - B B




BHEL REFERENCE DOCUMENTS / DRAWINGS

| DOCUMENT / DRAWING NO | DOCUMENT / DRAWING TITLE |
|---|---|
| MAITREE-00-UMA-C-103312-PEM | POWER HOUSE BUILDING FRAMING PLAN @ EL 24.00M FFL. |
| MAITREE-00-UMA-C-103612-PEM | POWER HOUSE BUILDING FRAMING PLAN @ EL 24.00M FFL. & 37.5M TOS |
| MAITREE-00-UMA-CH-100291-PEM | POWER HOUSE BUILDING ARCHITECTURAL FLOOR PLAN AT EL 24.00M. |
| PE-V0-421-554-A009 | TDS & GA FOR AIR WASHER & UAF WITH FAN & PUMP FOUNDATION DETAILS FOR VENTILATION SYSTEM. |

NOTES:

1. ALL EQUIPMENTS SHALL BE DESIGNED FOR CONTINUOUS DUTY.
2. ALL DIMENSIONS ARE IN MM, AND ELEVATIONS ARE IN MTRS. UNLESS OTHERWISE STATED.
3. TOTAL QTY. OF AIR WASHER UNIT LOCATED AT EL 24.00M LVL. UNIT # 1 ARE FOUR (4) NOS.
4. ALL SLAB/ROOF OPENINGS, AWU FOUNDATION AND MUNTY FOR INTAKE LOUVERS SHALL BE DONE BY BHEL.

| SUPPLY AIR FAN (1 x 100% capacity) | |
|---|---|
| AIR FLOW CAPACITY | : 125,000 CMH |
| FAN STATIC PRESSURE | : 75 mmWC. |
| WATER PUMP (2 x 100% capacity) | |
| WATER FLOW CAPACITY | : 125 CMH |
| HEAD | : 30 Mtr. |

**OPERATING LOAD OF AWU INCLUDING WATER : 19500 Kg. (Each)**

ROOF / SLAB OPENING SCHEDULE FOR UNIT -1

| S.No | Legend | Location | Opening Size | Floor level |
|---|---|---|---|---|
| 1. | SO-9 | B - C bay Grid - 23 & 24 | 4200 x 2600 | 32.50M |
| 2. | SO-10 | B - C bay Grid - 24 & 25 | 4200 x 2600 | 32.50M |
| 3. | SO-11 | B - C bay Grid - 25 | 4200 x 2600 | 32.50M |
| 4. | SO-12 | B - C bay Grid - 25 & 26 | 4200 x 2600 | 32.50M |
| 5. | SO-13 | B - C bay Grid - 23 & 24 | 2100 x 1900 | 32.50M |
| 6. | SO-14 | B - C bay Grid - 24 & 25 | 2500 x 1900 | 32.50M |
| 7. | SO-15 | B - C bay Grid - 25 | 2100 x 1900 | 32.50M |
| 8. | SO-16 | B - C bay Grid - 25 & 26 | 2100 x 1900 | 32.50M |

PROJECT: 2x660MW MAITREE SUPER THERMAL POWER PROJECT, RAMPAL, BANGLADESH (EPC MAIN PLANT PACKAGE)

OWNER CONSULTANT:
FICHTNER
M/s FICHTNER GmbH & Co KG, Stuttgart,GERMANY

OWNER:
BANGLADESH-INDIA FRIENDSHIP POWER COMPANY (PVT.) LIMITED, BANGLADESH

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECTS ENGINEERING MANAGEMENT
NOIDA

SCALE: 1 : 40
SHEET 2 OF 2

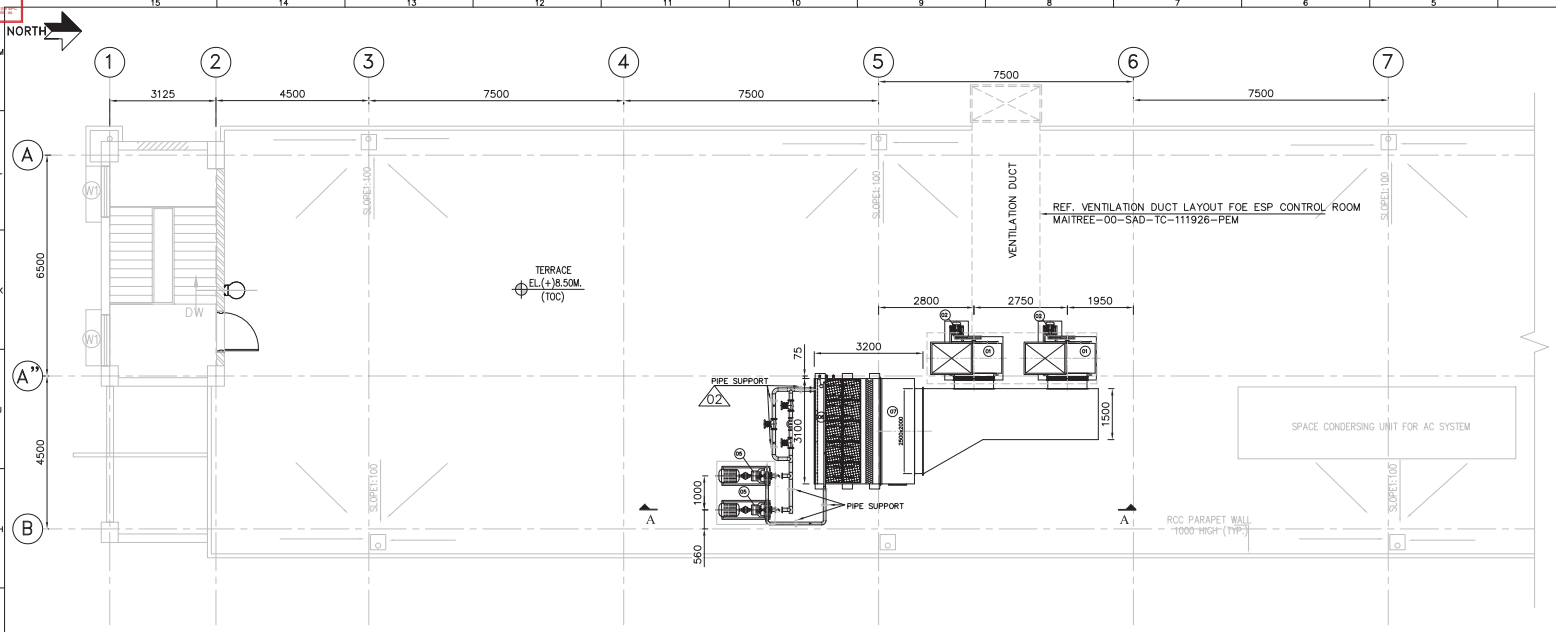
TITLE: AIR WASHER LAYOUT FOR B – C BAY SIDE ALONG WITH FOUNDATION DETAILS – T G BUILDING.

SIZE: | PROJECT NO.: 421 | FILE NO:

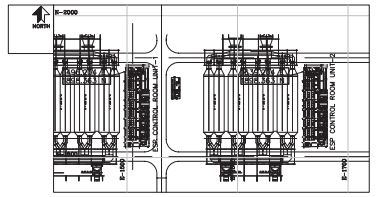
ANNEX: MAITREE-00-SAD-TC-111922-PEM | Rev-02

BHEL DWG NO : PE-V0-421-554-A023

SIZE-A1




UAF PLAN AT EL (+)8.50M (TOC)




KEY PLAN

BHEL REFERENCE DOCUMENTS / DRAWINGS

| DOCUMENT / DRAWING NO. | DOCUMENT / DRAWING TITLE |
|---|---|
| MAITREE-00-UCA-LH-100419-PEM | ELECTROSTATIC PRECIPITATOR CONTROL BUILDING ARCHITECTURAL PLANS. |
| MAITREE-00-SAD-DA-111908-PEM | DATA SHEET & GENERAL ARRANGEMENT FOR FOR AIR WASHER & UAF ALONG WITH FAN & PUMP FOUNDATION DETAILS FOR VENTILATION SYSTEM. |
| MAITREE-00-SAD-DA-111926-PEM | VENTILATION DUCT LAYOUT FOR ESP BUILDING. |

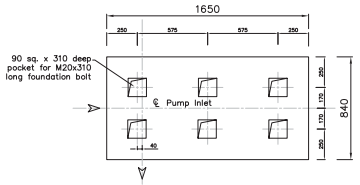
NOTES:

1. ALL EQUIPMENTS SHALL BE DESIGNED FOR CONTINUOUS DUTY.
2. ALL DIMENSIONS ARE IN MM, AND ELEVATIONS ARE IN MTRS. UNLESS OTHERWISE STATED.
3. UAF PUMP PIPING SUPPORT WILL BE TAKE CARE AS SUIT AT SITE BY AVPL.

**EQUIPMENT LOAD DETAILS :**

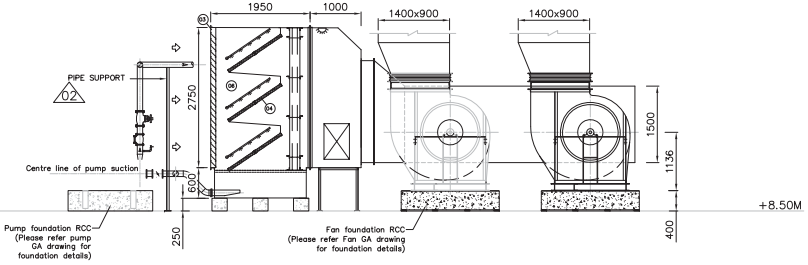
STATIC LOAD OF UAF INCUDING FAN & MOTOR : 1725 Kg.
OPERATING LOAD OF UAF INCUDING FAN & MOTOR : 5650 Kg.

| SUPPLY AIR FAN (2 x 50% capacity) | |
|---|---|
| AIR FLOW CAPACITY | : 2X 40,000 CMH |
| FAN STATIC PRESSURE | : 60 mmWC. |
| WATER PUMP (2 x 100% capacity) | |
| WATER FLOW CAPACITY | : 56 CMH |
| HEAD | : 30 Mtr. |

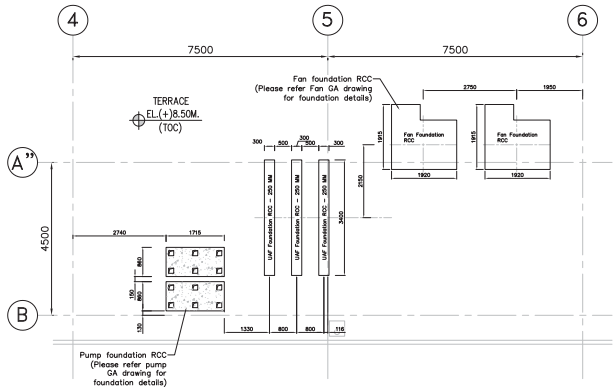



PLAN - PUMP FOUNDATION


SECTION - PUMP FOUNDATION




SECTION – A A




FOUNDATION PLAN AT EL (+)8.50M (TOC)

| PART NO. | DESCRIPTION | SIZE | QTY. | MAT'LS/MAKE |
|---|---|---|---|---|
| 07. | SUCTION DUCT WITH INSPECTION DOOR | 3100x1000x2750 | 1 no. | GSS |
| 06. | UAF ENCLOSURE | 3100x1950x2750 | 1 no. | GSS |
| 05. | WATER RE-CIRCULATION PUMP (END SUCTION) | – | 2 nos. | – |
| 04. | WATER REPELLENT FILTERS | 610x610x50 | 30 nos. | HDPE WIREMESH |
| 03. | FRESH AIR INTAKE LOUVRE WITH BIRD MESH (Door type) | 3100x2750 Ht. | 1 no. | GSS |
| 02. | MOTOR 11 KW/4POLE | – | 2 nos. | – |
| 01. | SUPPLY AIR FAN : FORM OF FAN : C3 | | 2 nos. | |

| REV. NO | DATE | DONE BY | CHECK BY | DESCRIPTION |
|---|---|---|---|---|

PROJECT: 2x660MW MAITREE SUPER THERMAL POWER PROJECT, RAMPAL, BANGLADESH (EPC MAIN PLANT PACKAGE)

OWNER CONSULTANT:
FICHTNER
M/s FICHTNER GmbH & Co KG,
Stuttgart,GERMANY

OWNER:
BANGLADESH-INDIA FRIENDSHIP POWER COMPANY (PVT.) LIMITED, BANGLADESH

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECTS ENGINEERING MANAGEMENT
NOIDA

SCALE: 1 : 60
SHEET 1 OF 1

TITLE: UAF LAYOUT ALONG WITH FOUNDATION DETAILS – ESP BUILDING UNIT 1 & 2.

SIZE: PROJECT NO.: 421 FILE NO:
ANNEX: MAITREE DWG NO : MAITREE-00-SAD-TC-111923-PEM REV.02
BHEL DWG NO : PE-VO-421-554-A024

SIZE-A2